Iowa Method (Intersections) - In Iowa, the approach used is similar to that of the Weighted Rank Method (see http://www.dot.state.ia.us/crashanalysis/pdfs/sicl_methodologies.pdf). Three ranking lists are generated and these three rank lists are subsequently combined into a single rank. The three sub-lists are a frequency rank (total crashes), a rate rank (crashes/volume), and a severity rank ("value loss" at the site).

The first step in the process is to identify the crashes that can be assigned, for this purpose, to each intersection. The crashes within 75 feet of urban intersections and 150 feet of rural intersections are assigned to the intersection, using a Geographic Information System (GIS). This information is then exported to a file which is later imported into SAS (SAS Institute Inc., Cary, NC). The file contains the crash assignation data for all intersections that have had at least one crash in a five-year time range. There are roughly 45,000 such intersections that meet this criteria.

Within SAS, the values for the separate rankings as well as the combined ranking are calculated. The first two ranking lists (frequency and rate) are generated much the same as the crash frequency/density methods and the crash rate method (see http://www.dot.state.ia.us/crashanalysis/pdfs/sicl_methodologies.pdf). The third ranking list (severity) is generated using a severity index method, based on criteria determined by the Iowa Department of Transportation (Iowa DOT) Office of Traffic and Safety (TAS). The three are combined using a weighting method, determined by TAS, to emphasize high severity locations.

Steps involved in the Iowa Safety Improvement Candidate Location (SICL) development process are:

1. The crash statistics are searched to identify all locations (intersections) in the State that have, for the designated five-year time span, at least one crash. There are typically roughly 45,000 intersections that meet these criteria. A file identifying cases assigned to each intersection is generated. A file detailing the road segments entering each intersection is also generated.
2. Both files are imported into SAS and further analyses are performed:
   a. The crash frequencies for the five-year time span are calculated. The frequencies determined include total crashes, total fatalities, and total major injuries.
   b. The daily entering vehicles (DEV) for each intersection are calculated by summing the 2-way volumes for each road segment associated with each intersection and dividing by 2. This is not absolutely correct given the nature of the road segmentation but it is a compromise made due to the systematic, statewide nature of the analyses and the large number of intersections for which data needs to be obtained. (An Iowa intersection database is under development.)
   c. Given the total crash frequencies and the DEV, the crash rates are calculated.
   d. Given the injury severity level frequencies, the severity indices are calculated using the following procedure:
       i. The first fatality in any one crash is converted to a major injury to partially mitigate the effect of random chance, seatbelt use, age-related skeletal-musculature frailty, etc.
       ii. The following values are multiplied against frequency of injury severity level:
           1. Fatality → 200
           2. Major Injury → 100
           3. Minor Injury → 10
           4. Possible or Unknown Injury → 1
       iii. These values are summed for each intersection to determine the severity indices.
   e. Each category (frequency, rate, and severity) are ranked individually. Ties are allowed.
   f. The values for each category are normalized using the highest value. Thus, if the highest value for rate is 50, all values for rate are divided by 50. The normalization is done to minimize the impact of any large number effect within a particular list when calculating the combined value for the subsequent combined rank.
   g. The three normalized lists are weighted using values of 1/5 for frequency, 1/5 for rate, and 3/5 for severity index. The combined value is attained by summing these three.
   h. The combined values are used to produce the combined statewide rank list. This list with a host of supporting information is exported to file.
3. Within Excel, column headers, borders, headers, and the like are applied to the list table.